

140684

Spring and Storm Water
Collection and Conveyance

New Jersey Zinc
East Plant
Palmerton, Pennsylvania

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RSCA 53140.01
February 2, 1976

AR302223

I. Purpose

Purpose of this report is to describe proposed spring and storm water collection and conveyance systems at the East Plant of the New Jersey Zinc Company located in Palmerton, Pennsylvania. Six springs are located along the southern limits of the plant site, on the slope of Blue Mountain. As depicted on engineering drawings prepared to supplement this report, collection will begin at the most easterly spring, number six, and extend westwardly along the south side of an existing plant railroad to a detention basin west of spring number four. Water will then be conveyed down a waste slope to a new swale flowing in an easterly direction to Aquashicola Creek. Storm and spring water in the vicinity of springs 1 through 3 will be conveyed by swale in a westerly direction to a collection box, conveyed by pipe down the waste slope, and discharged in the vicinity of an existing 60" cast iron pipe. Since existing 60" pipe is inadequate to convey total flow, a retention effect will occur in this vicinity.

This system will reduce erosion possibilities of waste piles by controlling storm water runoff and eliminate infiltration of spring waters into waste piles.

II. Springwater Volume

Flow measurements were taken on each of the six springs on October 7, 1975 using a "V" notch weir. Flows measured were relatively low and are as follow

<u>Spring No.</u>	<u>Measured Flows (cfs)</u>
1	0.003
2	0.019
3	0.035
4	0.013
5	0.184
6	<u>0.040</u>
Total Measured Spring Flow	0.294 cfs (132 gpm)

III. Estimated Peak Surface Runoff

Peak amount of storm water runoff from mountain area above springs was calculated using Soil Conservation Service Complex Soil Cover Method with a five year storm frequency. Results were favorably compared with those obtained with the Rational Method. Contributory drainage areas are indicated on Exhibit I.

<u>Location</u>	<u>Drainage Area</u>	<u>Peak Runoff</u>
Swale at Spring 6	90 Ac.	119 cfs.
Spring 5	70 Ac.	98 cfs.
Swale at Spring 5	186 Ac.	194 cfs.
Spring 4	265 Ac.	258 cfs
Retention Basin Inflow	327 Ac.	283 cfs.
Swale at Spring 1	260 Ac.	240 cfs
Collection Box Near Existing 60" CIP	285 Ac.	252 cfs

IV. Proposed System

Proposed system is to utilize open channels to convey storm water and collected springwater. Spring flow will be collected in an underdrain system conveyed to an open channel adjacent to the south side of the railroad. Channel will consist of a half section of 36" corrugated pipe with adjacent waste material stabilized with an asphalt coating. Road crossings will utilize corrugated pipe culverts to provide for vehicular crossing. All pipe culverts were sized based on inlet capacity.

This storm and spring control system was chosen because:

1. The open channel is easier to maintain because of its accessibility.
2. If future open channel relocation is required, it can be accomplished easily by disconnecting pipe sections and removing. No material must first be removed to gain access to the pipe.
3. Gabions and/or riprap provided at all pipe outfalls will control erosion.

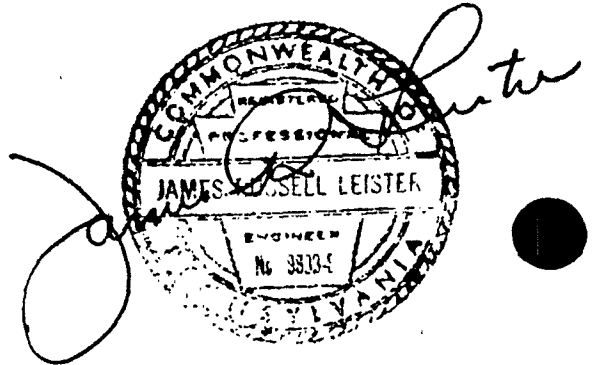
V. Detention Basin

The detention basin to be located west of Spring No. 4 is designed using the modified rational method for determining detained volume. Basin will have a volume of 197,000 cubic feet to handle a design inflow of 283 cfs and 250 cfs outflow. A 50' wide gabion protected emergency spillway will be provided to pass storms of greater design frequencies. Basin floor and side slopes will require a liner, preferably clay, to provide impermeability.

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Discharge from detention basin will be transported down the slope by pipe and discharged into a proposed swale which will flow in an easterly direction to the Aquashicola Creek. Swale improvements include:

1. A concrete blast wall placed at pipe discharge to reduce outfall velocity and direct flow into the swale.
2. Earthen berm around pipe discharge to raise the swale sidewalls and provide the minimum required swale depth.
3. Swale bottom will require rock fill and excavation to obtain design grade.



AR302226

EAST PLANT CINDER BANK
SUMMARY OF ACTIVITIES RELATIVE TO
RECOVERY OF METAL AND/OR ENERGY

(1) Railroads were taking some vertical retort residue for sub-ballast on railroad lines. Believe this was discontinued due to leaching of undesirable materials.

(2) Cement company or companies were taking some vertical retort residue as an additive. Believe they were interested in iron but zinc fouled preheaters and they discontinued practice.

(3) Royale Asturienne, France, had 20 years of vertical retort residue moved (approximately 730,000 tons) from their plant site at no cost to clear area for their electrolytic plant. Understand this material was used for sub-ballast on a new highway.

(4) Mitsui of Japan operates "MF" half-shaft blast furnaces with mixture of vertical retort residue, electrolytic leach residue, and steel fume. Amounts are adjusted to maintain 20% carbon and about 10% zinc in feed.

(5) The New Jersey Zinc Company operated blast furnaces and later electric furnaces for the recovery of iron and manganese from Waelz kiln residues.

(6) Attempts have been made to sell or give Waelz residue to persons to use as aggregates for sinter blocks with no success due to the high specific gravity.

(7) Waelz residue has been used for cindering icy roads.

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(8) Waelz kiln residue from Sterling crude was used by Bethlehem Steel for the scavenging effect of the manganese in open hearth furnaces into the early 1950's. The advent of more economical Spiegel iron (ferro alloys) and finally the B.O.F. eliminated this use.

(9) The New Jersey Zinc Company operated a small "half-shaft" blast furnace to investigate the "Recovery of Metal Values from Vertical Retort Residues....." periodically from February 1954 to December 1955. A report, Number 2079, covering the operation and results was issued dated May 7, 1956.

(10) A joint New Jersey Zinc Company Research-Technical Group report "A Preliminary Economic Analysis of the Horizontal Cyclone Smelting Using Palmer-ton Residues" was issued October 15, 1976.

(11) Preussag at Oker, Germany, operated "half" or "short shaft" blast furnaces for years with "good" results on some of their vertical retort residues. German government apparently edicted no more stockpiling and remove existing stockpile which almost forced Preussag to Lurgi cyclone furnace. (Actually developed by Royale Asturienne and Lurgi)

Cyclone was built in about 1977, ran intermittently for about six months, was shut down for re-design. Was restarted and is still apparently not operating satisfactorily. Apparently carbon content must be around 40% instead of 20-25% as first thought and extreme difficulties were experienced with slag carryover to boiler plugging boiler.

(12) A report was written, dated March 30, 1977, titled "Use of Half-Shaft Blast Furnace to Produce Fuel Gas for the Vertical Retorts" by Mr. C.H.Umstead, New Jersey Zinc Company Research Department.

(13) New Jersey Zinc Company Research Reports Nos. 218, 219, and 220 dated December 1978 covered the cyclone furnace and Hoboken-Overpelt furnace.

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(14) Fluidyne Corporation contacted New Jersey Zinc in October 1979 concerning a fluid bed combustor investigation under DOE's PON-1 program. Program was dropped.

(15) PP&L and G+W made a co-generation study "Combustion of Zinc Residues at Palmerton" with results of study reported by Mr. C.H.Umstead, New Jersey Zinc Company Research Department, in a report dated January 9, 1980. This report covers an economic study of the feasibility of burning NJZ carbon bearing residues to generate energy and recover metal values.

The report is based on information available at that time on the Lurgi cyclone furnace at the Preussag plant and the "MF" furnaces at the Mitsui plant. Memo M-3485 dated January 9, 1980 (#228).

(16) Recovery of Values from Palmerton Residues by B.C.Hafford, New Jersey Zinc Company Research Department, dated April 15, 1980.

(17) Willis and Paul Engineers, Inc. prepared a study in 1983 for utilizing a circulating type fluid bed boiler by Pyropower, Inc. of San Diego or Lurgi of Riveredge, NJ to burn vertical retort residue based on a project to use anthracite culm in Schuylkill County, Pennsylvania, the Kenvil Energy Project.

(18) Klein Laboratories of Arcadia, California, prepared a report dated April 29, 1983, for recovery of metals and carbon from typical vertical retort residues. This report was reviewed by Mr. P.E.McGarry, New Jersey Zinc Company Research Department.

(19) Rolla Research Center - Missouri School of Mines continues to investigate recovery techniques - copy of September 26, 1985 correspondence attached and marked Exhibit "C".

CEH -9/19/86

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The New Jersey Zinc Company, Inc.

FOUNDED 1848

Palmerton, Pa. 18071 • (215) 826-2111

TWX 510-651-7008



September 26, 1985

Dr. Ernest R. Cole, Jr.,
Research Supervisor,
Rolla Research Center,
U.S. Bureau of Mines,
1300 Bishop Avenue,
Rolla, Missouri - 65401.

Dear Ernie:

At your request to Fred Sauerwine, I have made arrangements to ship another representative sample of residue from our Palmerton cinder bank. This should have an analysis similar to the material I sent to you in November 1982.

If I can be of any further assistance in your investigation, feel free to call on me.

Sincerely,

THE NEW JERSEY ZINC COMPANY, INC.

PETER L. KERN

Vice President of Technology
and Special Products

PLK:MS

bc-Messrs. F.R. Sauerwine
G.R. Rothermel
P.L. Kern

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United States Department of the Interior

ORIGINAL
7-4

BUREAU OF MINES

1300 BISHOP AVENUE
ROLLA, MISSOURI 65401

August 29, 1985

Mr. F. R. Sauerwine
Superintendent - Technical Department
New Jersey Zinc Co, Inc.
Palmerton, PA 18071

Dear Fred:

I have enclosed a copy of a paper that we recently submitted for presentation at the International Symposium on Extractive Metallurgy of Zinc, Zinc 85 in Tokyo, Japan, October 14-16, 1985. We expect to have a better copy for you with clearer pictures at a later date.

We appreciate your support and that of your company in this vital and interesting research. Thanks to your efforts with the Waelz kiln dust we were able to complete the pilot scale test in Belgium. Also, Tom and I wish to thank you, very belatedly, for your hospitality during our visit in April. The discussions with you and your colleagues and the plant tour were informative and helpful.

The research is going very well and we should have our own small pilot cell in operation by the end of September. Although the funding is uncertain, the project will continue in the next fiscal year starting on October 1.

The enclosed paper is just the beginning and we have several others in various stages of preparation dealing with the use of zinc from waste as a source of zinc for electrogalvanizing. We will send you copies as they become available.

My best regards to Peter Kern. Please ask him to send me a 5-gallon representative sample of the residue. Based on some work with a similar material, we may have an efficient and economical treatment method.

Thanks again for your help and support.

Sincerely yours,

Ernest R. Cole, Jr.
Research Supervisor
Rolla Research Center

Enclosure

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SEP 3 1985

C O P Y



The New Jersey Zinc Company, Inc.

FOUNDED 1848

Palmerton, Pa. 18071 • (215) 826-2111



November 22, 1982

Dr. Ernest Cole,
Research Supervisor,
U.S. Bureau of Mines,
1300 Bishop Avenue,
Box 280,
Rolla, Missouri - 65401.

Dear Mr. Cole:

I welcomed the opportunity to talk to you about the recoverable resource aspects of NJZ residues. At your request I am forwarding, via UPS, a 20-pound sample of residue typical of that stockpiled at Palmerton. We estimate there is approximately 15,000,000 tons of this material at Palmerton with an additional 1,000,000 tons located at our Depue, Illinois, facilities.

The sample being sent to you is a composite of two core samples taken from our bank (D-22/30-40 and D-23/10-20). Our composite analysis (which you may wish to verify) is as follows:

<u>C</u>	<u>Zn</u>	<u>Cd</u>	<u>Pb</u>	<u>Cu</u>	<u>In</u>	<u>Au</u>	<u>Ag</u>
22.4%	2.7%	0.06%	0.8%	0.6%	0.005%	0.02 Oz./T.	1.3 Oz./T.

In addition to the above, the residue typically contains:

<u>SiO₂</u>	<u>Al₂O₃</u>	<u>Fe₂O₃</u>	<u>SO₃</u>	<u>CaO</u>	<u>MgO</u>	<u>MnO</u>	<u>K₂O</u>	<u>Na₂O</u>
20%	10%	18%	10%	7%	1%	1%	1%	1%

Over the years NJZ has considered many approaches to the recovery of values from the cinder banks. These not only included the study of fuel and metal recovery, but also the use of these residues in the preparation of pozzolanic cements and aggregates. Furthermore, on April 11, 1979, two 25-pound samples of similar residues were sent to Mr. Morris Fine, U.S. Bureau of Mines Research Director at Rolla. You may wish to check whether any work was done at that time.

We would be pleased to provide you with additional samples and information and to discuss results with you once you have had a chance to examine this material. We have been involved in costly revegetation programs both at Palmerton and at Depue, and the timeliness of the results of your investigation may have a bearing on these programs.

bc-Messrs.V.Stilo
W.R.Bechdolt
W.A.Smelas
P.L.Kern✓

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Dr. Ernest Cole

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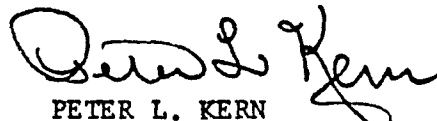
November 22, 1982

CONFIDENTIAL

If I can be of further assistance, please feel free to call.

Very truly yours,

THE NEW JERSEY ZINC COMPANY, INC.



PETER L. KERN
Director of Manufacturing
and Technical Services

PLK:MS

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